ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

MEMORANDUM

DATE: June 20, 1984

TO: Land Division File

FROM: Rick Hersemann, DLPC/FOS - Central Region

SUBJECT: LPC #0418080l - DOUGLAS COUNTY
TUSCOLA/CABOT CORPORATION (SUBPART F)

An inspection of the Cabot Corporation facility in Tuscola, Illinois was conducted on June 20, 1984. Those present during the inspection included Mr. Gabriel Paci, Manager - Environmental Affairs; Ms. Jackie Prueitt, Senior Laboratory Technician; and Mr. Rick Hersemann, IEPA, DLPC/FOS.

The purpose of the inspection was to check Cabot Corporation's (Cabot) compliance with Subpart F Interim Status Standards for groundwater monitoring. Cabot has a two-cell surface impoundment, excavated into glacial tills, which accepts D002 (corrosive) wastewater. The wastewater contains one to four percent hydrochloric acid. The wastewater enters the surface impoundment from the west through underground pipelines. The wastewater flows east through the surface impoundment to a sump located at the east end. The wastewater is pumped from the sump through underground pipelines to a deep injection well. The wastewater is injected under pressure through the disposal well into the Eminence-Potosi dolomite formation, approximately one mile below the ground surface. The wastewater is neutralized by the dolomites in the Eminence-Potosi Formation.

In addition to the hydrochloric acid wastewater, several other wastewaters generated at the facility are placed into the surface impoundment for disposal down the deep injection well. These wastes are: rainfall runoff from diked areas around product storage tanks, leachate collected from past disposal areas, acids from spills, and washings from the silane waste treatment scrubber and storage tanks. Prior to 1981, wastes generated at A. E. Staley Manufacturing Company of Decatur and R. R. Donnelley Company of Mattoon were deposited into the surface impoundment for disposal through the deep injection well. According to Mr. Paci, the wastewater accepted from R. R. Donnelley contained organic constituents.

The following information provides clarification and more detail to the Subpart F inspection checklists. Items are referenced to specific questions of Appendix A-1, Appendix A-2, Appendix B, and Appendix C checklists. Checklist items which are self-explanatory are not referenced. Checklist items needing clarification or more detail are referenced to the specific question's number.

Appendix A-1

2. Cabot has implemented a groundwater monitoring program which consists of one upgradient (MW1) and three downgradient (MW6, MW7, MW8) monitor wells screened in the uppermost aquifer underlying the facility. Monitor wells MW6, MW7, and MW8 replace monitor wells MW2, MW3 and MW4 in the program. Cabot has also implemented a groundwater quality assessment program with additional wells MW9, MW10, MW11, MW12, and MW13 being added to the program.

3. The upgradient monitor well (MW1) is located 400 feet west of the surface impoundment.

4. Downgradient monitor wells MW6 (south), MW7 (north), and MW8 (east) are shallow wells located at the edge of the dike around the surface impoundment. Downgradient monitor well MW9 is a deep well located next to MW6 on the south side of the surface impoundment. Downgradient monitor wells MW10, MW11, and MW12 are shallow monitor wells located on the east property line. Downgradient monitor well MW13 is a deep well located on the east property line just east of the Leach Field.

7. Boring logs with well completion details are in Agency files.

8. Cabot has developed and implemented a groundwater sampling and analysis plan. Information in the plan plus a copy of Cabot's groundwater quality assessment plan has been submitted to the Agency.

9. Cabot completed the first year of sampling for the parameters required in 725.192(b)(1), 725.192(b)(2), and 725.192(b)(3). Statistical evaluation of analysis results triggered the facility into a groundwater quality assessment program. Significant increase in specific conductance and TOX was found in wells MW2, MW3, and MW4. Significant increase in TOC was found in well MW2. Significant decrease in pH was found in wells MW1, MW2, MW3, and MW4.

Cabot's sampling program now consists of the following frequency of sampling and parameters to be analyzed for; per approved groundwater quality assessment program.

a. Sample wells MW1, MW6, MW7, and MW8 annually for parameters listed in 725.192(b)(2).

b. Sample wells MW1, MW6, MW7, and MW8 semiannually for parameters listed in 725.192(b)(3).

c. Sample wells MW1, MW6, MW7, MW8, MW9, MW10, MW11, MW12, and MW13 quarterly for hazardous waste constituents: Bis (2-Ethyl-Hexyl) phthalate, Carbon tetrachloride, Methylene chloride, and Tetrachloroethylene.

Cabot just collected the second quarter of samples for the four hazardous waste constituents.

10. Cabot has implemented an approved groundwater quality assessment program. Four hazardous waste constituents were found to have entered the groundwater. Cabot is currently evaluating the vertical and horizontal rate and extent of contamination. Additional deeper and/or shallow wells may need to be installed, based on sample results and Cabot's evaluations of groundwater conditions.

Appendix A-2

2. See 9 of Appendix A-1.

4. A certified groundwater quality assessment plan was submitted to Director Carlson in a letter from Cabot dated February 1, 1984. A supplement to the groundwater quality assessment plan was submitted to Compliance Monitoring in a letter from Cabot dated March 28, 1984. A proposal to modify the groundwater monitoring system, frequency of analyses, and parameters to be analyzed was submitted to Compliance Monitoring in a letter from Cabot dated May 5, 1984. The modification proposal was approved in a letter dated May 14, 1984.

Cabot determined that hazardous waste constituents Bis (2-Ethyl-Hexyl) phthalate, Carbon tetrachloride, Methylene chloride, and Tetrachloroethylene have entered the groundwater underlying the facility. Sampling for these constituents is being conducted on a quarterly basis with results and evaluations being submitted to the Agency. Cabot's consultant, Raul Piskin, is still evaluating data to determine the rate and extent of contamination.

Appendix B

1.3 Cabot has implemented an approved groundwater quality assessment program.

2.1 Cabot has an aerial photo and a 15 minute quadrangle map, scale 1 inch = 2000 feet; a map prepared by Bruce Yare & Associates, scale 1 inch = 200 feet; a map prepared by Rauf Piskin, scale 1 inch = 200 feet; and a plot plan of the plant, scale 1 inch = 200 feet; in the groundwater monitoring program. The topography near the facility is flat farmland. Significant topographic features in the area are the Kaskaskia River, surface impoundments and waste gypsum piles at the U.S. Industrial Chemical plant to the west, and Cabot's surface impoundment, leach field, and landfill. Cabot has 2 deep injection wells and USI has one deep injection well which inject wastewater with low pH's into the Eminence-Potosi dolomite formation.

2.2 Cabot has a regional hydrogeologic map, scale 1 inch = 2000 feet in the groundwater monitoring program. The map indicates that the Cabot facility is located on a major recharge zone. A groundwater divide is located just west of the Cabot facility. Groundwater west of the divide flows west and discharges into the Kaskaskia River. Groundwater east of the divide flows east-northeast and discharges near Tuscola. Shallow groundwater underlying the Cabot facility flows to the northeast.

2.3 Cabot's plot plan consists of the maps previously mentioned in 2.1.

2.4 Rauf Piskin prepared a site water table (potentiometric) contour map of the Cabot facility based on June-1983 groundwater elevations. Copy of map is in Agency files. Upgradient well MW1 is located 400 feet west of the surface impoundment and appears capable of providing representative ambient groundwater quality data. Downgradient wells on the map are MW2, MW3, MW4, MW5, MW6, MW7 and MW8. This map was prepared before wells MW9, MW10, MW11, MW12, and MW13 were installed as part of the groundwater quality assessment program. Quarterly groundwater quality assessments may provide data which would warrant updating the site water table (potentiometric) contour map.

3.1 Soil borings and monitor wells were drilled and installed by Shaffer-Krimmel-Silver of Decatur, Illinois under the supervision of Bruce Yare and Associates of Belleville, Illinois and Rauf Piskin of Hydropoll, Inc., Springfield, Illinois.

3.3 Thirteen soil borings were made by hollow stem auger for RCRA compliance. Monitor wells were installed in each of the thirteen borings. Copies of boring logs are in Agency files.

3.5 Lithologic samples were collected during the drilling at 5 foot intervals by split spoon and shelby tube sampling.

4.1 See 3.1

4.2 Thirteen monitor wells were installed for RCRA compliance. Monitor wells MW1, MW6, MW7, MW8, MW9, MW10, MW11, MW12, and MW13 are currently being sampled as part of the groundwater quality assessment program. Monitor wells MW2, MW3, and MW4 have been deleted from the program but are still functionable.

4.3 Well construction data for each monitor well is shown on the boring logs which are in Agency files. At the time of the inspection the monitor wells did not have locking caps. It was suggested to Mr. Paci that they install locking caps on the wells (Note: On the 7/10/84 sampling inspection all wells in the current program, except MW1, had locks. MW1 has a screw-on protective standpipe cap and can't be locked. However, site does have 24 hour security).

5.1 Raul Piskin prepared a geologic cross-section of the surface impoundment. (Submitted in October 21, 1983 letter to Glenn Savage - Central Region Manager). The surface impoundment, which is raised above ground level by clay dikes, is underlain by glacial till. The depth of the surface impoundment is approximately 10 feet from the top of the dike to the bottom of the surface impoundment.

5.2 Cabot's facility is underlain by several hundred feet of glacial tills. Permeability of the tills range from 1.1×10^{-8} to 7.5×10^{-9} cm/sec. The uppermost saturated zone is sand lenses within the glacial till clay and silt.

5.3 Static water levels are measured using a steel tape. Seasonal fluctuations in the static water levels occur which should not alter groundwater gradients and flow directions. Groundwater should flow radially from the surface impoundment's recharge mound in all directions. Regional groundwater flow has been determined to be to the northeast.

Deep well MW9 is showing contamination which may indicate a vertical flow. The contamination may have been carried down during drilling. The groundwater quality assessment plan is determining the extent of horizontal and vertical contamination.

5.4 Aquifer hydraulic properties were determined by falling head tests and soil permeability tests conducted in the laboratory. The falling head tests showed the horizontal soil permeability to range from 5.8×10^{-5} to 6.6×10^{-5} cm/sec. Vertical permeability determined from laboratory tests ranged from 1.1×10^{-8} to 7.5×10^{-9} cm/sec.

6.1 Monitor wells are screened in the upper and middle portion of the uppermost aquifer underlying the facility. Well clusters are located south of the surface impoundment (MW6, MW9) and along the east property line just each of the leach field (MW10, MW13).

7.2 Monitor wells are sampled with a peristaltic pump. Each monitor well has a designated tygon tubing which connects to the sampling pump. This eliminates cross-contamination of samples. A galvanized bailer is also used on deep wells MW9 and MW13 if the peristaltic pump will not draw samples. The bailer is rinsed with deionized water between sampling of wells.

8.0 Samples are collected and placed in the proper preservation bottles. Samples are delivered to the proper laboratory along with a lab sheet containing the proper chain-of-custody control. Samples are refrigerated until time of analysis.

9.1 Sample analysis is performed by Cabot's laboratory is Tuscola, Illinois; Daily Analytical Laboratory in Peoria, Illinois; TEI Analytical Laboratory in Park Ridge, Illinois; and Envrionmental Laboratory, Inc. in Gulfport, Mississippi.

9.7 Information from field activity logs is recorded on the chain-of-custody control form for each sample collected.

10.0 Site verification of Cabot's facility was made by physically inspecting the area around the surface impoundment. The surface impoundment, leach field, landfill, and monitor wells were checked for verification. All items correspond to the plot plan.

Cabot's two-celled surface impoundment is composed of a north and a south cell. The north cell was not in operation. The south cell was in operation and contained 6 to 7 feet of wastewater and 4 feet of freeboard. Both cells are approximately 10 feet deep. Both cells are diked and elevated above the ground level of the surrounding area. The dikes around the surface impoundment are covered with gravel. The elevated surface impoundment acts as a recharge zone to the shallow groundwater.

Appendix C

1.1 Hazardous waste constituents found to be originating from the waste management area include: Carbon tetrachloride, Tetrachloroethylene, Methylene chloride, and Bis (2-Ethyl-Hexyl) phthalate.

1.2 Downgradient monitor wells MW2, MW3, and MW4 showed significant increases in TOX and specific conductance and significant decreases in pH. Student's T-Test was not performed on wells MW5, MW6, MW7, and MW8. Mr. Paci said that the contamination levels in wells MW5, MW6, MW7, and MW8 were such that if the Student's T-Test were performed, the results would be the same as those found in wells MW2, MW3, and MW4. Cabot implemented the groundwater quality assessment program, assuming that the shallow groundwater underlying the surface impoundment is contaminated, based on analysis results and statistical evaluations.

1.4 Laboratory analysis results for all quarters sampled show obvious groundwater contamination near the surface impoundment.

3.1 Consultant Raul Piskin is still evaluating, as part of the approved groundwater quality assessment plan, the rate and extent of migration of hazardous waste constituents.

3.2 Additional monitor wells MW9, MW10, MW11, MW12, and MW13 were installed as part of the groundwater quality assessment program. Well construction data is found in table B-2 of Appendix B. A map showing well numbers and locations is attached. Well clusters are located south of the surface impoundment (MW6, MW9) and along the east property line, just east of the leach field (MW10, MW13). The rate of contamination migration is still being determined by Rauf Piskin. If contamination is found in deep wells MW9 and MW13, additional deeper wells will be installed.

Summary

Cabot Corporation has implemented and is operating a groundwater quality assessment program in compliance with the 35 Illinois Administrative Code, Part 725, Subpart F - - Groundwater Monitoring and the approved Groundwater Quality Assessment Program - revised May 5, 1984 and approved May 14, 1984 by Compliance Monitoring. Cabot's groundwater monitoring program consists of upgradient well (MW1) and downgradient wells (MW6, MW7, MW8, MW9, MW10, MW11, MW12, and MW13). Hazardous waste constituents Carbon tetrachloride, Tetrachloroethylene, Methylene chloride, and Bis (2-Ethyl-Hexyl) phthalate have been found to have entered the shallow groundwater underlying the Cabot facility.

The following items shall be evaluated and submitted as part of the approved Groundwater Quality Assessment Program.

1. Rate of groundwater flow beneath the facility.

2. Vertical and horizontal extent of groundwater contamination.

3. Results of terrain conductivity survey as outlined in September 14, 1983 correspondence.

4. Updated site water table (potentiometric) contour map when rate and extent of groundwater contamination has been determined.

RH:jg

cc: DLPC/FOS, Central Region (2)
DLPC/Compliance Monitoring

APPENDIX A-1

FACILITY INSPECTION FORM FOR COMPLIANCE WITH INTERIM STATUS STANDARDS COVERING GROUND-WATER MONITORING

Company Name: Cabot Corporation; IEPA I.D. Number: LPC# 04/80801

Company Address: P.O. Box 188; USEPA I.D. Number: 042075333

Tuscola, IL 61953 Inspector's Name: Rick Hersemann DLPC/FOS

Company Contact/Official: Gabriel Paci; Branch/Organization: _____

Title: Manager - Environmental Affairs Date of Inspection: June 20, 1984

Jackie Prueitt - Senior Lab. Tech.

	Yes	No	Unknown	Wavied
Type of facility: (check appropriately)				
a) surface impoundment	X			
b) landfill				
c) land treatment facility				
d) disposal waste pile*				
Ground-Water Monitoring Program				
1. Was the ground-water monitoring program reviewed prior to site visit? If "No,"	X			
a) Was the ground-water program reviewed at the facility prior to site inspection?	X			
2. Has a ground-water monitoring program (capable of determining the facility's impact on the quality of groundwater in the uppermost aquifer underlying the facility) been implemented? 725.190(a)	X			

*Listed separate from landfill for convenience of identification.

CC: DLPC/Division File ✓
DLPC/FOS - Central Region (2)
DLPC/Compliance Monitoring
Cabot Corporation

	Yes	No	Unknown	Wavied
3. Has at least one monitoring well been installed in the uppermost aquifer hydraulically upgradient from the limit of the waste management area? 725.191(a)(1)	X	---	MW 1	---
a) Are ground-water samples from the uppermost aquifer, representative of background ground-water quality and not affected by the facility (as ensured by proper well number, locations and depths?)	X	---		
4. Have at least three monitoring wells been installed hydraulically downgradient at the limit of the waste handling or management area? 725.191(a)(2)	X	---	MW 6, MW 7, MW 8 MW 9, MW 10, MW 11 MW 12, MW 13	
a) Do well numbers, locations and depths ensure prompt detection of any statistically significant amounts of hazardous waste or hazardous waste constituents that migrate from the waste management area to the uppermost aquifer?	X	---		---
5. Have the locations of the waste management areas been verified to conform with information in the ground-water program?	X	---	---	
a) If the facility contains multiple waste management components, is each component adequately monitored?	NA	---		
6. Do the numbers, locations, and depths of the ground-water monitoring wells agree with the data in the ground-water monitoring system program? If "No," explain discrepancies.	X	---	---	
7. Well completion details. 725.191(c)				
a) Are wells properly cased?	X	---	---	
b) Are wells screened (perforated) and packed where necessary to enable sampling at appropriate depths?	X	---	---	
c) Are annular spaces properly sealed to prevent contamination of ground-water?	X	---	---	

	Yes	No	Unknown	Wavied
8. Has a ground-water sampling and analysis plan been developed? 725.192(a)	X			
a) Has it been followed?	X			
b) Is the plan kept at the facility:	X			
c) Does the plan include procedures and techniques for:				
1) Sample collection?	X			
2) Sample preservation?	X			
3) Sample shipment?	X			
4) Analytical procedures?	X			
5) Chain of custody control?	X			
9. Are the required parameters in ground-water samples being tested quarterly for the first year? 725.192(b) and 725.192(c)(1)	X			
a) Are the ground-water samples analyzed for the following:				
1) Parameters characterizing the suitability of the ground-water as a drinking water supply? 725.192(b)(1)	X			
2) Parameters establishing ground-water quality? 725.192(b)(2)	X			
3) Parameters used as indicators of ground-water contamination? 725.192(b)(3)	X			
(i) For each indicator parameter are at least four replicate measurements obtained at each upgradient well for each sample obtained during the first year of monitoring? 725.192(c)(2)	X			
(ii) Are provisions made to calculate the initial background arithmetic mean and variance of the respective parameter concentrations or values obtained from the upgradient well(s) during the first year? 725.192(c)(2)	X			

	Yes	No	Unknown	Wavied
b) For facilities which have completed first year ground-water sampling and analysis requirements:				
1) Have samples been obtained and analyzed for the ground-water quality parameters at least annually? 725.192(d)(1)	X			
2) Have samples been obtained and analyzed for the indicators of ground-water contamination at least semi-annually? 725.192(d)(2)	X			
c) Were ground-water surface elevations determined at each monitoring well each time a sample was taken? 725.192(e)	X			
d) If it was determined that modification of the number, location or depth of monitoring wells was necessary, was the system brought into compliance with 725.191(a)? 725.193	X			
10. Has an outline of a ground-water quality assessment program been prepared? 725.193(a)	X			
a) Does it describe a program capable of determining:				
1) Whether hazardous waste or hazardous waste constituents have entered the ground-water?	X			
2) The rate and extent of migration of hazardous waste or hazardous waste constituents in ground-water?	X			
3) Concentrations of hazardous waste or hazardous waste constituents in ground-water?	X			
b) Were records kept of the analyses and evaluations, specified in the ground-water quality assessment (throughout the active life of the facility)? 725.194(b)(1)	X			
1) If a disposal facility, were(are) records kept through the post-closure period as well?		NA		

	Yes	No	Unknown	Wavied
11. Have records been kept of analyses for parameters in 725.192(c) and (d)? 725.194(a)(1)	X			
12. Have records been kept of ground-water surface elevations taken at the time of sampling for each well? 725.194(a)(1)	X			
13. Have records been kept of required elevations in 725.192(e)? 725.194(a)(1)	X			

*EPA will be proposing (Spring 1982) to replace this reporting requirement with an exception reporting system where reports will be submitted only where maximum contaminant levels or significant changes in the contamination indicators or other parameters are observed. EPA has delayed compliance stage for 14 a) above until August 1, 1982 (Federal Register, February 23, 1982, p. 7841-7842) to be coupled with exception reporting in the interim.

APPENDIX A-2

COMPLIANCE FORM FOR A FACILITY WHICH
MAY BE AFFECTING GROUND-WATER QUALITY

Company Name: Cabot Corporation ; IEPA I.D. Number: LPC# 04180801

Company Address: P.O. Box 188 ; USEPA I.D. Number: 042075333

Tuscola, IL. 61953 Inspector's Name: Rick Hersemann

Company Contact/Official: Gabriel Paci; Branch/Organization: _____

Title: Manager - Environmental Affairs; Date of Inspection: June 20, 1984

Jackie Prueitt - Senior Lab Tech.

	Yes	No	Unknown
Type of facility: (check appropriately)			
a) surface impoundment	X	___	
b) landfill	___	___	
c) land treatment facility	___	___	
d) disposal waste pile	___	___	
1. Have comparisons of ground-water contamination indicator parameters for the upgradient well(s) 725.193(b) shown a significant increase (or pH decrease as well) over initial background?	___	X	
a) If "Yes," has this information been submitted to the Director according to 725.194(a)(2)(ii)?	___	___	
2. Have comparisons of indicator parameters for the downgradient wells 725.193(b) shown a significant increase (or pH decrease as well) over initial background?	X	___	___
a) If "Yes," were additional ground-water samples taken for those downgradient wells where the significant difference was determined? 725.193(c)(2)	X	___	
1) Were samples split in two?	___	X	
2) Was the significant difference due to human (e.g., laboratory) error? (If "Yes," do not continue.)	___	X	

	Yes	No	Unknown
3. If significant differences were not due to error, was a written notice sent to the Director within 7 days of confirmation?	X		
4. Within 15 days of notification of the Director was a certified ground-water quality assessment plan submitted? 725.193(d)(2)	X		
a) Does the plan specify 725.193(d)(3):			
1) well information (specifics):			
(a) number?	X		
(b) locations?	X		
(c) depths?	X		
2) sampling methods?	X		
3) analytical methods?	X		
4) evaluation methods?	X		
5) schedule of implementation?	X		
b) Does the plan allow for determination of 725.193(d)(4):			
1) Rate and extent of migration of hazardous waste or hazardous waste constituents?	X		
2) Concentrations of the hazardous waste or hazardous waste constituents?	X		
c) Is it indicated that the first determination was made as soon as technically feasible? 725.193(d)(5)	X		
1) Within 15 days after the first determination was a written report containing the assessment of ground-water quality submitted to the Director?	X		
d) Was it determined that hazardous waste or hazardous waste constituents from the facility have entered the ground-water?	X		
1) If "No," was the original indicator evaluation program, required by 725.192 and 725.193(b), reinstated?		NA	

	Yes	No	Unknown
(a) Was the Director notified of the reinstatement of program within 15 days of the determination? 725.193(d)(6)	NA		
e) If it was determined that hazardous waste or hazardous waste constituents have entered the ground-water 725.193(d)(7):			
1) For facilities where a program was implemented prior to final closure, are determinations of hazardous waste or hazardous waste constituents continued on a quarterly basis? (If a program was implemented during the post-closure care period, determinations made in accordance with the ground-water quality assessment plan may cease after the first determination.)	X		
(a) Were subsequent ground-water quality reports submitted to the Director within 15 days of determination?	X		
f) Are annual reports submitted to the Director containing the results of the ground-water quality assessment program? 725.194(b)(2)	X		
1) Do the reports include the calculated or measured rate of migration of hazardous waste or hazardous waste constituents during the reporting period?		X	NOT DETERMINED YET. DATA BEING EVALUATED BY RALF PISKIN

APPENDIX -B

GROUND-WATER MONITORING AND ALTERNATE SYSTEM TECHNICAL INFORMATION FORM

APPENDIX B

GROUND-WATER MONITORING AND ALTERNATE SYSTEM TECHNICAL INFORMATION FORM

1.0 Background Data:

Company Name: Cabot Corporation ; EPA I.D.#: ILD# 042075333
Company Address: P.O. Box 188 LPC # 04180801
Tuscola, IL. 61953

Inspector's Name: Rick Hersemann ; Date: June 20, 1984

1.1 Type of facility (check appropriately):

1.1.1	surface impoundment	X
1.1.2	landfill	
1.1.3	land treatment facility	
1.1.4	disposal waste pile	

1.2 Has a ground-water monitoring system been established? (Y/N) Y

1.2.1 Is a ground-water quality assessment program outlined or proposed? (Y/N) Y

If Yes,

1.2.2 Was it reviewed prior to the site visit? (Y/N) Y

1.3 Has a ground-water quality assessment program been implemented or proposed at the site? (Y/N) Y

If yes, Appendix C, Ground-Water Quality Assessment Program Technical Information Form must be utilized also.

2.0 Regional/Facility Map(s)

2.1 Is a regional map of the area, with the facility delineated, included? (Y/N) Y

If yes,

2.1.1 What is the origin and scale of the map? Aerial Photo and 15' Quad. 1"= 2000', Map by Bruce Yare 1"= 200', Map by Rauf Piskin 1"=20

2.1.2 Is the surficial geology adequately illustrated? (Y/N) Y

2.1.3 Are there any significant topographic or surficial features evident? (Y/N) Y

If yes, describe Kaskaskia River - west, surface impoundments, Leach Field, land fill - Cabot, Gypsum Piles - USI

2.1.4 Are there any streams, rivers, lakes, or wet lands near the facility? (Y/N) Y

If yes, indicate approximate distances from the facility Kaskaskia River - 8000 Feet - west
USI surface impoundments - 3,000 to 4000 feet to west

2.1.5 Are there any discharging or recharging wells near the facility? (Y/N) N

If yes, indicate approximate distances from the facility. 2 Waste disposal wells are located on-site at Cabot Corp. 1 waste disposal well is located at USI

2.2 Is a regional hydrogeologic map of the area included? (This information may be shown on 2.1) (Y/N) Y

If yes:

2.2.1 Are major areas of recharge/dishcarge shown? (Y/N) Y

If yes, describe. Cabot Corp. is located in a major recharge zone. A groundwater divide is located just west of Cabot Corp., seperating groundwater flow, east - west.

2.2.2 Is the regional ground-water flow direction indicated? (Y/N) Y

2.2.3 Are the potentiometric contours logical? (Y/N) Y
If not, explain. Shallow groundwater underlying the Cabot facility flows to the northeast

2.3 Is a facility plot plan included? (Y/N) Y

2.3.1 Are facility components (landfill areas, impoundments, etc.) shown? (Y/N) Y

2.3.2 Are any seeps, springs, streams, ponds, or wetlands indicated? (Y/N) N

2.3.3 Are the locations of any monitoring wells, soil borings, or test pits shown? (Y/N) Y

2.3.4 Is the facility a multi-component facility? (Y/N) N

If yes:

2.3.4.1 Are individual components adequately monitored? (Y/N) NA

2.3.4.2 Is a Waste Management Area delineated? (Y/N) NA

2.4 Is a site water table (potentiometric) contour map included? (Y/N) Y

If yes,

2.4.1 Do the potentiometric contours appear logical based on topography and presented data? (Consult water level data) (Y/N) Y

2.4.2 Are groundwater flowlines indicated? (Y/N) Y

2.4.3 Are static water levels shown? (Y/N) Y

2.2.4 May hydraulic gradients be estimated? (Y/N) Y

2.4.5 Is at least one monitoring well located hydraulically upgradient of the waste management area(s)? (Y/N) Y

2.4.6 Are at least three monitoring wells located hydraulically downgradient of the waste management area(s)? (Y/N) Y

2.4.7 By their location, do the upgradient wells appear capable of providing representative ambient groundwater quality data? (Y/N) Y

If no, explain. _____

_____

_____

3.0 Soil Boring/Test Pit Details

3.1 Were soil borings/test pits made under the supervision of a qualified professional? (Y/N) Y

If yes,

3.1.1 Indicate the individual(s) and affiliation(s): Rauf Piskin - Hydropoll, Inc. - Springfield, IL. Bruce Yare & Associates - Belleville, IL.

3.1.2 Indicate the drilling/excavating contractor, if known Shaffer - Krimmel - Silver - Decatur, IL

3.2 If soil borings/test pits were made, indicate the method(s) of drilling/excavating:

- Auger (hollow or solid stem) X
- Mud rotary
- Air rotary
- Reverse rotary
- Cable tool
- Jetting
- Other, including excavation (explain)

3.3 List the number of soil borings/test pits made at the site

3.3.1 Pre-existing -

3.3.2 For RCRA compliance 13

3.4 Indicate borehole diameters and depths (if different diameters and depths use TABLE B-1).

3.4.1 Diameter: 7 inch diameter

3.4.2 Depth: See Table B-2

3.5 Were lithologic samples collected during drilling? (Y/N) Y

If yes,

3.5.1 How were samples obtained? (Check method(s))

- Split spoon X
- Shelby tube, or similar X
- Rock coring
- Ditch sampling
- Other (explain)

INFORMATION TABLE B-1

BORING NO.	DEPTH	DIAMETER

3.5.2 At what interval were samples collected? 5 foot interval

3.5.3 Were the deposits or rock units penetrated described? (boring logs, etc.) (Y/N) Y

3.6 If test pits were excavated at the site, describe procedures. None Excavated

4.0 Well Completion Detail

4.1 Were the wells installed under the supervision of a qualified professional? (Y/N) Y

If yes:

4.1.1 Indicate the individual and affiliation, if known
Rauf Piskin - Hydropoll, Inc. - Springfield, IL.
Bruce Yare & Associates - Belleville, IL.

4.1.2 Indicate the well construction contractor, if known
Shaffer-Krimmel-Silver - Decatur, IL.

4.2 List the number of wells at the site

4.2.1 Pre-existing —

4.2.2 For RCRA Compliance 13

4.3 Well construction information (fill out INFORMATION TABLE B-2)

4.3.1 If PVC well screen or casing is used, are joints (couplings):

- Glued on
- Screwed on X

4.3.2 Are well screens sand/gravel packed? (Y/N) Y

INFORMATION TABLE B-2

	WELL NO.	MW 1	MW 2	MW 3	MW 4	MW 5	MW 6
	GROUND ELEVATION	693.4	690.7	686.9	690.9	690.0	690.0
	TOTAL DEPTH	31.3	31.4	29.8	30.5	29.8	30.2
WELL CASING	TYPE MATERIAL	PVC	PVC	PVC	PVC	PVC	PVC
	DIAMETER	2"	2"	2"	2"	2"	2"
	LENGTH	34.3	34.4	32.8	33.5	32.8	33.2
	STICK-UP	3.0	3.0	3.0	3.0	3.0	3.0
	TOP ELEVATION	696.4	693.7	689.9	693.9	693.0	693.0
	BOTTOM ELEVATION	662.1	659.3	657.1	660.4	660.2	659.8
WELL SCREEN	DEPTH TOP/BOTTOM	11.4 / 31.3	11.4 / 31.4	10.0 / 29.8	10.6 / 30.5	10.5 / 29.8	10.9 / 30.2
	TYPE MATERIAL	PVC	PVC	PVC	PVC	PVC	PVC
	DIAMETER	2"	2"	2"	2"	2"	2"
	LENGTH	19.9	20.0	19.8	19.9	19.3	19.3
	SLOT SIZE	10	10	10	10	10	10
	TOP ELEVATION	682.0	679.3	676.9	680.3	679.5	679.1
	BOTTOM ELEVATION	662.1	659.3	657.1	660.4	660.2	659.8
OPEN HOLE OR SAND/GRAVEL PACK	DEPTH TOP/BOTTOM						
	DIAMETER						
	LENGTH						
	TOP ELEVATION						
	BOTTOM ELEVATION						

INFORMATION TABLE B-2

	WELL NO.	mw7	mw8	mw9	mw10	mw11	mw12	mw13
	GROUND ELEVATION	690.0	690.0	691.5	689.7	686.6	691.0	689.0
	TOTAL DEPTH	30.2	30.0	51.0	16.3	15.6	16.5	50.2
WELL CASING	TYPE MATERIAL	PVC	PVC	PVC	PVC	PVC	PVC	PVC
	DIAMETER	2"	2"	2"	2"	2"	2"	2"
	LENGTH	33.2	33.0	53.8	19.3	18.3	19.4	53.5
	STICK-UP	3.0	3.0	2.8	3.0	2.7	2.9	3.3
	TOP ELEVATION	693.0	693.0	694.3	692.7	689.3	693.9	692.3
	BOTTOM ELEVATION	659.8	660.0	640.5	673.4	671.0	674.5	638.8
WELL SCREEN	DEPTH TOP/BOTTOM	10.9 / 30.2	10.9 / 30.0	45.7 / 51.0	6.7 / 16.3	6.0 / 15.6	6.9 / 16.5	45.4 / 50.2
	TYPE MATERIAL	PVC	PVC	PVC	PVC	PVC	PVC	PVC
	DIAMETER	2"	2"	2"	2"	2"	2"	2"
	LENGTH	19.3	19.1	5.3	9.6	9.6	9.6	4.8
	SLOT SIZE	10	10	10	10	10	10	10
	TOP ELEVATION	679.1	679.1	645.8	683.0	680.6	684.1	643.6
	BOTTOM ELEVATION	659.8	660.0	640.5	673.4	671.0	674.5	638.8
OPEN HOLE OR SAND/GRAVEL PACK	DEPTH TOP/BOTTOM							
	DIAMETER							
	LENGTH							
	TOP ELEVATION							
	BOTTOM ELEVATION							

4.3.3 Are annular spaces sealed? (Y/N) Y

If yes, describe:

- bentonite slurry X
- Cement grout X
- Other (explain) _____

- Thicknesses of seals Varies - Top of screen to ground surface

4.3.4 If "open hole" wells, are the cased portions sealed in place? (Y/N) _____

If yes, describe how: NONE INSTALLED

4.3.5 Are there cement surface seals? (Y/N) Y

If yes,

- How thick? ≈ 1-2 feet

4.3.6 Are the wells capped? (Y/N) Y

If yes,

- Do they lock? (Y/N) N

4.3.7 Are protective standpipes cemented in place? (Y/N) Y

4.3.8 Were wells developed? (Y/N) Y

If yes, check appropriate method(s):

- Air lift pumping X
- Pumping and surging
- Jetting
- Bailing
- Other (explain)

5.0 Aquifer Characterization

5.1 Has the extent of the uppermost saturated zone (aquifer) in the facility area been defined? (Y/N) Y

If yes,

5.1.1 Are soil boring/test pit logs included? (Y/N) Y

5.1.2 Are geologic cross-sections included? (Y/N) Y

5.2 Is there evidence of confining (low permeability) layers beneath the site? (Y/N) Y

If yes,

5.2.1 Is the areal extent and continuity indicated? (Y/N) Y

5.2.2 Is there any potential for saturated conditions (perched water) to occur above the uppermost aquifer? (Y/N) N

If yes, give details: _____

_____

_____

a) Should or is this perched zone being monitored? (Y/N) ____

Explain _____

_____

5.2.3 What is the lithology and texture of the uppermost saturated zone (aquifer)? _____

Silty clay / silt with sand lenses

_____

5.2.4 What is the saturated thickness, if indicated? _____

NOT INDICATED

5.3 Were static water levels measured? (Y/N) Y

If yes,

5.3.1 How were the water levels measured (check method(s)).

- Electric water sounder ____
- Wetted tape ____
- Air line ____
- Other (explain) X Steel Tape

_____

5.3.2 Do fluctuations in static water levels occur? (Y/N) Y

If yes,

5.3.2.1 Are they accounted for (e.g. seasonal, tidal, etc.)? (Y/N) Y

If yes, describe: Seasonal

_____

_____

5.3.2.2 Do the water level fluctuations alter the general ground-water gradients and flow directions? (Y/N) N

If yes,

5.3.2.3 Will the effectiveness of the wells to detect contaminants be reduced? (Y/N) N

Explain _____

_____

_____

5.3.2.4 Based on water level data, do any head differentials occur that may indicate a vertical flow component in the saturated zone? (Y/N) Y

If yes, explain Deep well MW 9 shows contamination which may indicate a vertical flow. Assessment plan is determining the extent of horizontal & vertical contamination

5.4 Have aquifer hydraulic properties been determined? (Y/N) Y

If yes,

5.4.1 Indicate method(s):

- Pumping tests ____
- Falling/constant head tests X
- Laboratory tests (explain) X - Permeabilities

_____

_____

5.4.2 If determined, what are the values for:

- Transmissivity ____
- Storage coefficient ____
- Leakage ____
- Permeability (Average Vertical) 1.25×10^{-9}
- Porosity ____
- Specific capacity ____

5.4.3 In cases where several tests were undertaken, were discrepancies in the results evident? (Y/N) N

If yes, explain _____

_____

5.4.4 Were horizontal ground-water flow velocities determined? (Y/N) N

If yes, indicate rate of movement _____

_____

6.0 Well Performance

6.1 Are the monitoring wells screened in the uppermost aquifer? (Y/N) Y

6.1.1 Is the full saturated thickness screened? (Y/N) N

6.1.2 For single completions, are the intake areas in the: (check appropriate levels)

- Upper portion of the aquifer X
- Middle of the aquifer X
- Lower portion of the aquifer ____

6.1.3 For well clusters, are the intake areas open to different portions of the aquifer? (Y/N) Y

6.1.4 Do the intake levels of the monitoring wells appear to be justified due to possible contaminant density and groundwater flow velocity? (Y/N) Y

7.0 Ground-Water Quality Sampling

7.1 Is a sampling (groundwater quality) program and schedule included? (Y/N) Y

7.2 Are sample collection field procedures clearly outlined? (Y/N) Y

7.2.1 How are samples obtained: (check method(s))

- Air lift pump ____
- Submersible pump ____
- Positive displacement pump ____
- Centrifugal pump ____
- Peristaltic or other suction-lift pump X
- Bailer ____
- Other (describe) ____

7.2.2 Are all wells sampled with the same equipment and procedures? (Y/N) Y

If no, explain Peristaltic pump is used. A galvanized steel bailer was used one time on well #9

7.2.3 Are adequate provisions included to clean equipment after sampling to prevent cross-contamination between wells? (Y/N) Y

7.2.4 Are organic constituents to be sampled? (Y/N) Y

If yes,

7.2.4.1 Are samples collected with equipment to minimize absorption and volatilization? (Y/N) Y

If yes,

Describe equipment Designated tygon tubing in each monitor well.

8.0 Sample Preservation and Handling

8.1 Have appropriate sample preservation and preparation procedures been followed (filtration and preservation where appropriate)? (Y/N) Y

8.2 Are samples refrigerated? (Y/N) Y

8.3 Are EPA recommended sample holding period requirements adhered to? (Y/N) Y

8.4 Are suitable container types used? (Y/N) Y

8.5 Are provisions made to store and ship samples under cold conditions (ice packs, etc.)? (Y/N) Y

8.6 Is a chain of custody control procedure clearly defined? (Y/N) Y

8.7 Is a specific chain of custody form illustrated? (Y/N) Y

If yes,

8.7.1 Will this form provide an accurate record of sample possession from the moment the sample is taken until the time it is analyzed? (Y/N) Y

9.0 Sample Analysis and Record Keeping

9.1 Is sample analysis performed by a qualified laboratory? (Y/N) Y

Indicate lab Cabot Lab, Daily Analytical, TEI Analytical, Environmental Lab, Inc.

9.2 Are analytical methods described in the records? (Y/N) Y

9.2.1 Are analytical methods acceptable to EPA? (Y/N) Y

9.3 Are the required drinking water suitability parametters tested for? (Y/N) Y

9.4 Are the required groundwater quality parameters tested for? (Y/N) Y

9.5 Are the required groundwater contamination indicator parameters tested for? (Y/N) Y

9.6 Are any analytical parameters determined in the field? (Y/N) N

Identify:

- pH ____
- Temperature ____
- Specific conductance ____
- Other (describe) _____

_____

9.7 Is a plan included to record information about each sample collected during the groundwater monitoring program? (Y/N) Y

9.7.1 Are field activity logs included? (Y/N) Y

9.7.2 Are laboratory results included? (Y/N) Y

9.7.3 Are field procedures recorded? (Y/N) Y

9.7.4 Are field parameter determinations included? (Y/N) N

9.7.5 Are the names and affiliation of the field personnel included? (Y/N) Y

9.8 Are statistical analyses planned or shown for all water quality results where necessary? (Y/N) Y

9.8.1 Is an analysis program set-up which adheres to EPA guidelines? (Y/N) Y

9.8.2 Is Student's t-test utilized? (Y/N) Y
If other evaluation procedure used, identify _____

_____

9.8.3 Are provisions made for submitting analysis reports to the Regional Administrator? (Y/N) Y

10.0 Site Verification

10.1 Plot Plan indicating the locations of various facility components, ground-water monitoring wells, and surface waters? (Y/N Y)

10.1.1 Is the plot plan used for the inspection the same as in the monitoring program plan documentation? (Y/N) Y

If not, explain _____

_____

10.1.2 Are all of the components of the facility identified during the inspection addressed in the monitoring program documentation? (Y/N) Y

If not, explain _____

_____

10.1.3 Are there any streams, lakes or wetlands on or adjacent to the site? (Y/N) Y

If yes, indicate distances from waste management areas _____

Kaskaskia River - 8000 Feet - west

USI Surface Impoundments - 3000 - 4000 Ft. west

10.1.4 Are there any signs of water quality degradation evident in the surface water bodies? (Y/N) N

If yes, explain _____

_____

_____

10.1.5 Is there any indication of distressed or dead vegetation on or adjacent to the site? (Y/N) N

If yes, explain _____

_____

_____

10.1.6 Are there any significant topographic or surficial features on or near the site (e.g., recharge or discharge areas)? (Y/N) Y

If yes, explain Storage Pond - recharge area

Groundwater divide - west of site

10.1.7 Are the monitor well locations and numbers in agreement with the monitoring program documentation? (Y/N) Y

If no, explain _____

_____

10.1.7.1 Were locations and elevations of the monitor wells surveyed into some known datum? (Y/N) Y

If not, explain _____

_____

■ - Wells in Program

● - Deep Well

● - Upgradient Well

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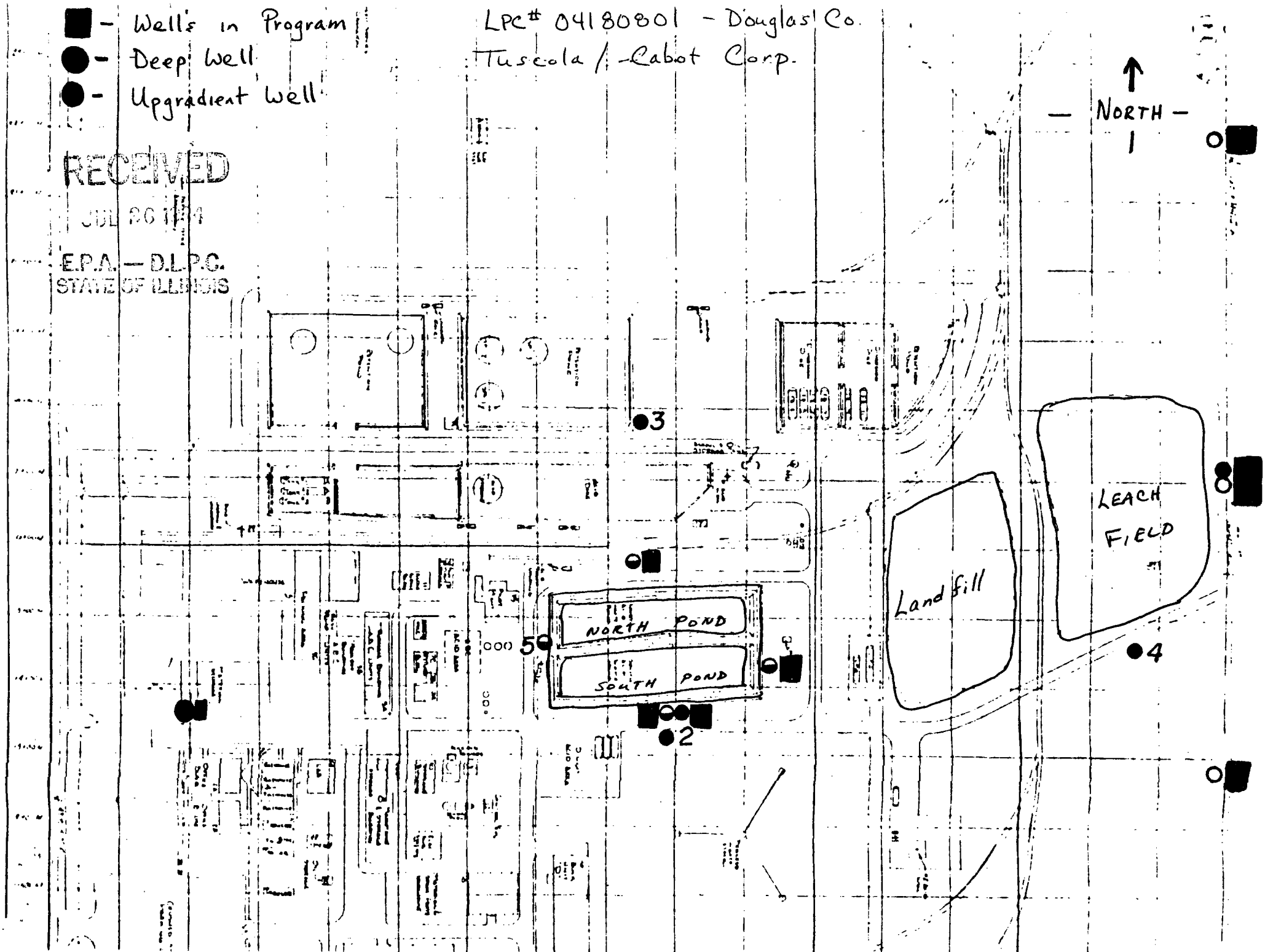
Tuscola / Cabot Corp.



10.1.7.2 Were the wells sounded to determine total depth below the surface? (Y/N) Y

If not, explain _____

10.1.7.3 Were discrepancies in total depth greater than two feet apparent in any well? (Y/N) N

If yes, explain _____

10.1.8 Was ground water encountered in all monitoring wells? (Y/N) Y

If not, indicate which well(s) were dry _____

10.1.9 Were water level elevations measured during the site visit? (Y/N) Y

If yes, indicate well number and water level elevation _____

If not, explain _____

TOC - Top of Casing

Well #	Stickup	Depth to Water (toc)	Total Depth (toc)
mw 1	3.0	6.1	34.3
mw 6	3.1	6.8	33.9
mw 7	3.1	8.5	33.8
mw 8	2.7	7.3	33.5
mw 9	2.7	30.0	55.0
mw 10	2.8	6.4	19.5
mw 11	2.7	7.3	18.2
mw 12	2.9	7.0	19.7
mw 13	3.0	12.1	53.4

APPENDIX - C

GROUND-WATER QUALITY ASSESSMENT PROGRAM INFORMATION FORM

APPENDIX C

GROUND-WATER QUALITY ASSESSMENT PROGRAM
INFORMATION FORM

Company Name: Cabot Corporation ; EPA I.D.#: ILD# 042075333
Company Address: P.O. Box 188 LPC # 04180801
Tuscola, IL. 61953

Inspector's Name: Rick Hersemann ; Date: June 20, 1984

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1.0 Background

1.1 List the constituents (contaminants) originating from the waste management area: (use separate sheet if necessary Carbon Tetrachloride
Tetrachloroethylene
Methylene Chloride
Bis(2-Ethyl-Hexyl) Phthalate

1.2 Have the concentrations of the hazardous waste or hazardous waste constituents shown significant increases in:

- upgradient monitoring wells (Y/N) N
- downgradient monitoring wells (Y/N) Y

1.2.1 List or indicate on a map, the wells which have shown significant increases: (use separate sheet if necessary) Wells 2,3,4 showed significant increase in TOX, TOC, and significant decreare in pH. T-test not performed on wells 5,6,7,8 but they will show same results.

1.3 Were the significant increases in contaminant concentration determined through the use of the student's t-Test? (Y/N) Y

If no,

1.3.1 Explain procedure used _____

1.4 Has the possibility of error (e.g., laboratory) been eliminated? (Y/N) Y

1.4.1 Explain Lab results show obvious groundwater contamination near surface impoundment

2.0 Contaminant Characteristics

2.1 If available, list the chemical and physical properties of the contaminants which have been detected in the ground water: (density, solubility, etc.). Include on a separate sheet if list is extensive Information not available for 4 contaminants

3.0 Implementation of the Assessment Program

3.1 Has the extent of the migration of hazardous waste or hazardous waste constituents been determined? (Y/N) Y

Note: Still being determined by Rauf Piskin

If yes,

3.1.1 Indicate how: (check appropriate method(s))

- additional ground-water monitoring wells X
- geophysical methods X
- computer simulation
- other, explain

3.2 Were monitoring wells installed? (Y/N) Y

If yes,

3.2.1 Record monitoring well/peizometer completion data on INFORMATION TABLE C-1.

3.2.2 Were well clusters (nests) used or were wells with multiple intake areas constructed? Give details See table B-2 of Appendix B

Well clusters : 6- shallow, 9- deep and 10 shallow, 13 deep

3.2.3 Show the numbers and locations of the additional wells/peizometers on a site map. Copy of map in assessment plan

3.2.4 Are the locations of the wells/piezometers justified in view of the water table or potentiometric surface map? (Y/N) Y

Give details

3.2.5 Are the depths of the monitoring wells/ piezometers justified due to the relative characteristics (e.g., densities) of the contaminants? (Y/N) Y
Give details _____

3.2.6 List any other methods (e.g., soil sample analysis) used to document the extent of the contamination. (use separate sheet if necessary) Geophysical methods and groundwater sampling used to document extent of contamination. No soil sample analysis made.

3.3 Has the rate of contaminant migration been determined? (Y/N) N

If yes, what is it and how was it determined? _____
Rate of contamination is being determined by Rauf Piskin, Hydropoll, Inc.

3.3.1 Does the rate of migration differ for various contaminants? (Y/N) Unknown
Give details _____

3.3.2 If known, what is the cause (reason) of (for) this differential in migration rates? _____

ENVIRONMENTAL PROTECTION AGENCY STATE OF ILLINOIS

L P C F C 0 5 5 C
(1) (8) (9)

OBSERVATION REPORT - SITE INVENTORY NO. 0 4 1 8 0 8 0 1
(11) (18)

DOUGLAS CO. - L.P.C. Region # C Date 0 7/1 0/8 4
(20) (25)

TUSCOLA / CABOT Corp (Subpart F) Letter Sent (Yes or No) N
(Location) (Responsible Party) (26)

Samples Taken: Yes (X) No ( ) Time: From 0 9 : 3 0 A m Weather Sunny 90's Dry
Ground Water (X) Surface ( ) Other ( ) To 1 2 : 1 5 P m
Photos Taken: Yes ( ) No (X) Interviewed Jackie Prueitt, Wally Smith Inspector R A H
(27) (29)

Previous Inspection 6-20-84 Previous Correspondence 10-7-83 Site Open: Yes (X) No ( )

OPERATIONAL STATUS:		TYPE OF OPERATION:				AUTHORIZATION:	
Operating	(X)	Landfill	( )	Storage	(X)	E.P.A. Permit	( )
Temporarily Closed	( )	Random Dump	( )	Salvage	( )	Variance	( )
Closed Not Covered	( )	Other Impoundment	(X)	A.C.D.	( )	21(e)	( ) NA
Closed and Covered	( )	Quantity Received Daily(1-6)	NA (30)			Board Order	( )
						Illegal (5)	( )

IMPROVED

Apparent Non-Compliance (5) ( )

SAMP

DETERIORATED

I (S) or D S (62)

RECEIVED
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E.P.A. — D.L.P.C.
STATE OF ILLINOIS

31

GENERAL REMARKS: Subpart F groundwater sampling of monitor wells around surface impoundment was conducted on 7-10-84 with Dale Elenberger. Samples were collected with Cabot's air lift pump and galvanized bailer. Samples were split with Jackie Prueitt and Wally Smith of Cabot Corp. Wells sampled were G101 (upgradient) and G106, G107, G108, G109, G110, G111, G112, and G113. Wells G109 and G113 are deep wells. All wells are 2 inch PVC with protective steel casings and locking tops.

INTERVIEW: Field pH was taken during sampling at the wells. pH for G106 was 1.0, pH for G108 was 2.0, and pH for G113 was 13.0 Field pH for these wells would indicate that the groundwater in these wells is hazardous. Field pH in the other well was all 6.0. Wells G106 and G108 are located next to the surface impoundment while G113 is located east of the Leach Field and adjacent to a farm field.

(GL) - Measurement from ground level

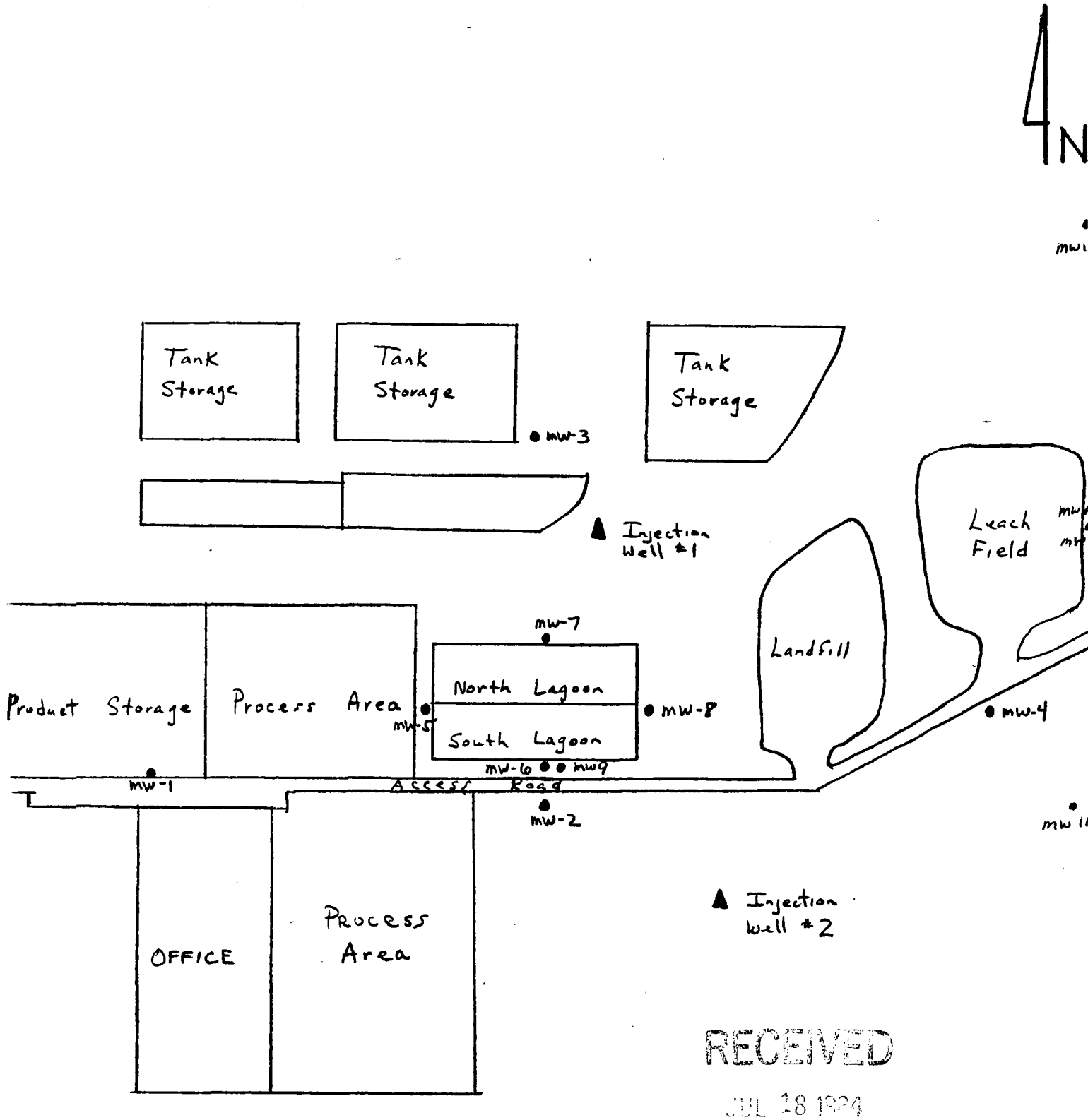
DIAGRAM:

Well #	Stickup *	Depth to H_2O (GL)	Depth - Total (GL) *
G101	3.0 Ft.	2.5 Ft.	31.3 Ft.
G106	3.1 Ft.	2.4 Ft.	30.8 Ft.
G107	3.1 Ft.	5.2 Ft.	30.7 Ft.
G108	2.7 Ft.	4.1 Ft.	30.8 Ft.
G109	2.7 Ft.	39.8 Ft.	52.3 Ft.
G110	2.8 Ft.	2.7 Ft.	16.7 Ft.
G111	2.7 Ft.	3.8 Ft.	15.5 Ft.
G112	2.9 Ft.	3.9 Ft.	16.8 Ft.
G113	3.0 Ft.	28.7 Ft.	51.4 Ft.

* Stickup and Total Depth measured on 6-20-84

DOUGLAS Co. - LPC 04180801 DATE: 7-10-84

TUSCOLA / CABOT CORP. TIME: 9:30 AM - 12:15 P.M



67 11/80 NOT TO SCALE